U. S. NAVAL SUBMARINE MEDICAL CENTER

Submarine Base, Groton, Conn.

MEMORANDUM REPORT NO. 68-9

SUBJECT ACCEPTANCE OF STANNOUS FLUORIDE TREATMENT

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ABSTRACT

Responses concerning acceptance were obtained from 370 subjects in a preventive dentistry study using stannous fluoride. The subjects were in five treatment categories: operator-applied three-agent stannous fluoride; operator-applied three-agent placebo; self-preparation stannous fluoride; self-preparation placebo; and self-preparation stannous fluoride minus interproximal taping. The self-preparation method differed from the operator-applied method in that the subject performed his own prophylaxis with a toothbrush and pumice paste, instead of having it performed with a polishing cup.

Results indicate some aversion to taste and gingival effects of the materials used. No effects were deemed severe enough to warrant recommendation of any significant changes in the present stannous fluoride program. Patient acceptance was found to be closely related to his beliefs in the effectiveness of the treatment, indicating the importance of education as a part of the Navy's preventive dentistry program.

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MR005.19-6042 14 May 1968

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SUMMARY PAGE

THE PROBLEM

Past experience with stannous fluoride preventive dentistry applications has indicated the presence of some objectionable features to this agent. With the mass application of SnF_2 using a self-preparation technique, some measure of subject tolerance is required. Accordingly, a study of acceptance among a group of 370 Naval men was made.

FINDINGS

There were some mild aversions to taste and to the gingival effects of these agents in the self-preparation technique. Patient acceptance was found to be closely related to belief in the effectiveness of the treatment.

APPLICATIONS

On the basis of these findings no significant changes in the present stannous fluoride application techniques are recommended. It is pointed out that added emphasis should be given to educating Naval personnel concerning the benefits of this preventive dentistry program in order to increase its acceptance.

ADMINISTRATIVE INFORMATION

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INTRODUCTION

The preventive dentistry programs which have evolved in the military services are essentially public health programs and can have application to any population, military or civilian. Stannous fluoride application is an integral part of the Navy's preventive dentistry program. As with any public health program, two main areas for concern in the Navy's stannous fluoride applications are: 1) its effectiveness, and 2) its acceptance by the operator and by the subject.

The effectiveness of the three-agent method of stannous fluoride treatment of naval personnel is well established.[1] Very little study has been made, however, of the acceptance of this treatment. Benhart[2] measured taste response to a stannous fluoride-silex-silicon dental prophylaxis paste used by the United States Air Force. He reported a "slightly less than average subjective acceptance by the patients."

It seemed desirable, therefore, to attempt to discover some facts concerning subject acceptance of the Navy's stannous fluoride applications.

MATERIALS AND METHODS

The subjects were those currently in a study to evaluate the effectiveness of self-preparation for stannous fluoride treatment at the Submarine Medical Research Laboratory, Submarine Medical Center, Groton, Connecticut.

The subjects were divided at random into five treatment groups. Group A received the operator-applied three-agent stannous fluoride treatment. This consisted of a prophylaxis utilizing 8.9% SnF_2 in a prophylaxis paste, a 15-second topical application of a 10% aqueous solution of SnF_2 and home use of a dentifrice containing 0.4% SnF_2. Group B was treated in a manner identical to Group A, but all materials were placebo, containing NaCl in the same concentration as the SnF_2. Group C received the same treatment as Group A, except that the prophylaxis was self-applied by a method modified from that described by Foster.[3] Group D received treatment identical to Group C, except that all materials were placebo as described under Group B. Group E received the same treatment as Group C, minus the interproximal taping with dental floss.

The design of the study called for re-examination after 6, 12, 18 and 24 months. At the six month re-examination a questionnaire was administered to discover subject acceptance. The results were analyzed non-parametrically (chi square).

RESULTS

The responses to the question concerning a straightforward appraisal of treatment acceptance are generally favorable (Table I). Only two percent of the subjects indicated a rejection of the treatment and 83 percent indicated appreciation for the treatment. No differences in acceptance are noted between groups.

Table I—How did you feel about getting the fluoride treatment?

Response	Group A N=64	B N=58	C N=95	D N=81	E N=72	Total N=370
Appreciated getting the treatment	54 (84%)	46 (79%)	80 (84%)	70 (86%)	57 (79%)	307 (83%)
Didn't really want to have it	1 (2%)	0	1 (1%)	1 (1%)	5 (7%)	8 (2%)
Didn't care one way or the other	8 (12%)	12 (21%)	14 (15%)	10 (13%)	10 (14%)	54 (15%)
No response	1	0	0	0	0	1

Responses concerning taste of the materials are given in Tables II, III and IV. In Table II, it is noted that group differences do exist. When the prophylaxis is self-applied, it is seen that the placebo material containing sodium chloride (Group D) elicits significantly less responses of bad taste than do the stannous fluoride groups, Groups C and E, ($P < .01$). The differences between the operator-applied test and placebo groups (A and B) were not significant. When comparing all three stannous flouride test groups (A, C and E), it is seen that Group A, the operator-applied group, gave significantly fewer responses of bad taste than did Groups C and E.

When the taste of the pumice mixture and the aqueous solution is compared (Table III), again, no significant differences are found between the responses of the operator-applied test and placebo groups. When com-

paring the self-preparation groups, differences are noted between the test and the placebo groups, particularly in the bad taste of the pumice mixture. These differences are statistically significant ($P < .01$). Comparison between all test groups (A, C, E) indicates greater objection to the pumice mixture when it is self-applied rather than operator-applied.

Table II — How did the stannous fluoride material taste?

Response	Group A N=64	B N=58	C N=95	D N=81	E N=72	Total N=370
Tasted very bad	3 (5%)	0	11 (12%)	3 (4%)	9 (12%)	26 (7%)
Tasted bad	17 (27%)	13 (22%)	41 (43%)	20 (25%)	27 (37%)	118 (32%)
Did not taste bad	42 (66%)	42 (72%)	42 (44%)	58 (71%)	35 (49%)	219 (59%)
No response	2	3	1	0	1	7

Table III — What difference did you find between the pumice paste and the water solution?

Response	Group A N=64	B N=58	C N=95	D N=81	E N=72	Total N=370
Did not object to either one	38 (59%)	39 (67%)	35 (37%)	52 (64%)	23 (32%)	187 (50%)
Pumice paste tasted worse	8 (12%)	5 (9%)	42 (44%)	16 (20%)	26 (36%)	97 (26%)
Water solution tasted worse	5 (8%)	1 (2%)	4 (4%)	8 (10%)	6 (8%)	24 (6%)
Both tasted equally bad	6 (9%)	7 (12%)	13 (14%)	5 (6%)	15 (21%)	46 (12%)
No response	7	6	1	0	2	16

No significant differences were noted in the length of time that the reported tastes persisted (Table IV). It should be noted that only a small number of the men reported any long term taste effects.

Table IV — How long did the stannous fluoride taste stay with you?

Response	Group A N=64	B N=58	C N=95	D N=81	E N=72	Total N=370
It disappeared immediately after the treatment	6 (9%)	7 (12%)	3 (3%)	10 (12%)	3 (4%)	29 (8%)
It lasted less than one hour	26 (41%)	30 (52%)	39 (41%)	37 (46%)	26 (36%)	158 (43%)
It lasted more than one hour but less than one day	28 (44%)	16 (28%)	47 (49%)	33 (41%)	36 (50%)	160 (43%)
It lasted a long time	0	1 (2%)	5 (5%)	1 (1%)	5 (7%)	12 (3%)
No response	4	4	1	0	2	11

When analyzing for effects of the treatment on the gum tissue, (Table V), one again sees no differences between the operator-applied test and placebo groups. It is interesting to note that the only case of pain persisting for several days among the operator-applied subjects occurred in a subject receiving the placebo treatment. The greater number of responses indicating pain in the self-applied fluoride groups (C and E), compared with the self-applied placebo group (D), were statistically significant ($P < .01$). When all stannous fluoride groups (A, C, E) were compared (Group A had significantly fewer responses of pain than did the groups which brushed the pumice on their own teeth ($P < .01$). Differences were noted between

Table V — What effect did the treatment have on your gums?

Response	Group A N=64	B N=58	C N=95	D N=81	E N=72	Total N=370
It had no effect	41 (64%)	38 (66%)	44 (46%)	44 (54%)	34 (47%)	201 (54%)
It made them feel good	11 (17%)	10 (17%)	9 (9%)	15 (19%)	9 (12%)	54 (15%)
It made them hurt during the treatment	9 (14%)	5 (9%)	22 (23%)	18 (22%)	16 (22%)	70 (19%)
It made them hurt for several days	0	1 (2%)	19 (20%)	3 (4%)	10 (14%)	33 (9%)
No response	3	4	1	1	3	12

the two placebo groups (B and D); particularly in the number that hurt during treatment. These differences, however, could have been caused by chance occurrence.

Only seven responses indicated no belief in the value of the treatment (Table VI), but it is well to note that one-half of the responses indicated insufficient knowledge about the expected benefits.

It is somewhat difficult to get a fair indication of how well this treatment is really accepted. Even though each subject in the study had a chance to refuse the treatment, still any military group senses the presence of authority which may preclude complete free choice being present. For this reason, two questions were included which contained the condition "If you were in civilian life, would you have this treatment?" The data in Table VII indicated that 33% would accept stannous fluoride treatment, even if they had to pay for it. If the treatment were free (Table VIII), 72% indicate that they would accept it. Only 4% would definitely refuse the treatment even if it were free. No differences between groups were noted, with the exception of Group B in Table VII. The responses indicating acceptance were significantly lower in this group than in groups A and E. No reason is apparent for these differences. It is interesting to note that the rejections ("no" responses) are no greater in the self-preparation groups than in the operator-applied groups.

Table VI — What good do you think the treatment did? (Multiple responses and groups combined)

Did no good	— 7 (2%)
Gives me strong teeth	— 17 (4%)
Helps prevent decay	— 141 (35%)
Gives me strong gums	— 29 (7%)
Don't know	— 205 (50%)
No response	— 8 (2%)
Total	405 responses

Table VII — If you were in civilian life would you have this treatment if you had to pay for it?

Response	Group A N=64	B N=58	C N=95	D N=81	E N=72	Total N=370
Yes	20 (31%)	11 (18%)	41 (43%)	25 (31%)	25 (35%)	122 (33%)
No	11 (17%)	8 (14%)	15 (16%)	18 (22%)	16 (22%)	68 (18%)
Don't know	32 (50%)	37 (64%)	38 (40%)	38 (47%)	30 (42%)	175 (47%)
No response	1	2	1	0	1	5

Table VIII — If you were in civilian life would you have this treatment if it were free?

Response	Group A N=64	B N=58	C N=95	D N=81	E N=72	Total N=370
Yes	47 (73%)	35 (60%)	72 (76%)	55 (32%)	48 (68%)	268 (72%)
No	4 (5%)	0	5 (5%)	2 (2%)	5 (7%)	16 (4%)
Don't know	12 (19%)	21 (36%)	17 (18%)	13 (16%)	18 (26%)	81 (22%)
No response	1	2	1	0	1	5

The response-spread to the question "Would you have this treatment in civilian life if you had to pay for it?" was sufficient to permit analysis of some factors related to this indication of acceptance. It was felt that taste of the materials, the amount of gingival irritation, and feelings of benefit may be related to acceptance.

There was no relationship between acceptance of the treatment and its taste (Table IX). When analyzing the overall distribution of responses to gingival effects related to acceptance, there is no significant relationship (Table X). There was a greater number of rejection responses in the "Hurt for several days" responders than in the "Made them feel good" responders. This difference, however, was only of borderline significance ($P < .05$).

Table IX — Relationship between Acceptance of the Treatment and its Taste. Would you have this treatment in civilian life if you had to pay for it?

Taste response	N	Yes	No	Don't know
Tasted very bad	26	8 (31%)	7 (27%)	11 (42%)
Tasted bad	117	38 (32%)	23 (20%)	55 (48%)
Did not taste bad	213	75 (34%)	39 (18%)	105 (48%)

Table X — Relationship Between Acceptance of Treatment and its Effect on the Gums. Would you have this treatment in civilian life if you had to pay for it?

Effect on gums	N	Yes	No	Don't know
Had no effect	203	54 (82%)	33 (13%)	100 (51%)
Made them feel good	54	24 (44%)	4 (7%)	26 (49%)
Hurt during the treatment	71	28 (82%)	14 (20%)	34 (48%)
Hurt for several days	33	12 (36%)	9 (27%)	12 (37%)

Table XI — Relationship Between Acceptance of Treatment and Belief in its Benefit. Would you have this treatment in civilian life if you had to pay for it?

Responses concerning benefit of treatment	N	Yes	No	Don't know
"Did no good or Don't know response"	211	45 (21%)	50 (24%)	115 (55%)
Responses indicating belief in some benefit of treatment	152	78 (50%)	18 (12%)	58 (38%)

The responses concerning expected benefit (Table VI) were separated into two categories: those indicating no or unknown expected benefit and those indicating any type of expected benefit. The relationship between those responses and acceptance of treatment responses (Table XI) were highly significant ($P < .001$). Thus, the men who believed in the benefit of the treatment indicated greater likelihood of getting stannous fluoride treatment, again, even if they had to pay for it.

DISCUSSION

Those associated with preventive dentistry programs involving the application of stannous fluoride are aware that some objection to the material's taste is encountered. It is also well-known that some gingival effects occur ranging from transient blanching to rather severe marginal inflammation, particularly in those cases where the prophylaxis was not carefully performed. The authors are not aware of any case in which these ill effects were great enough to more than temporarily affect the oral health. One could not be so certain however that the patient's outlook was not conditioned by these effects.

It is heartening to note that about 50% of those men receiving the stannous fluoride did not think it tasted bad. The greater feelings of bad taste in the self-preparation groups may have resulted from a more prolonged taste exposure to large amounts of the pumice mixture during brushing when compared with the more controlled application with the polishing cup. In all aspects of

taste responses there seems to be this "self-preparation effect," but within the self-preparation groups there is an added fluoride effect. Thus, operator-applied placebo and test group do not differ significantly concerning taste; but the operator-applied fluoride group reported less bad taste effects than the self-preparation fluoride groups and the self-preparation placebo group reported less bad taste than did the self-preparation fluoride groups.

When examining the gingival effects, the same pattern as was present for taste responses is again noted; namely, the self-preparation effect and the fluoride effect. The small number of ill effect responses in the operator-applied groups is again quite heartening; however, the fact that 17% of the self-preparation fluoride groups reported pain for several days could be cause for concern and should stimulate attempts at better control of this treatment application.

Even the best programs of dental care in preventive dentistry can not be effective in the total population unless they are well accepted by that population. Some concern must be felt when it is realized that only one-third of the subjects studied felt strongly enough about this treatment to indicate that they would seek it if they had to pay for it. The analysis of factors related to this response certainly indicate that the acceptance or lack of acceptance is not so much related to the taste or temporary gingival effects, but is rather related to a more basic consideration of the value of the treatment. We of the dental profession are therefore always faced with a very real challenge. Even though we may show the effectiveness of some agent such as stannous fluoride, it is also necessary to educate the recipient population so that everyone understands the value of the treatment and will actually seek it.

SUMMARY

1. Responses of subjects in a stannous fluoride study indicate some aversion on the basis of taste and gingival effects of the materials used.

2. The effects reported are not considered to be severe enough or frequent enough to recommend any significant change in the present stannous fluoride program.

3. Patient-acceptance of the treatment was found to be closely related to his beliefs in the effectiveness of the treatment.

4 It is concluded that more effort should be expended in educating the recipient population in the benefits of the stannous fluoride program.

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13. ABSTRACT

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